INSTRUCTION MANUAL

A0059-20-600

MODEL TTS 59B MF SENDER

ISSUE 1

OCT 1972

PRINTED IN U.S.A.

NORTHEAST ELECTRONICS

Airport Road, Concord, New Hampshire 03301 • (603) 224-6521

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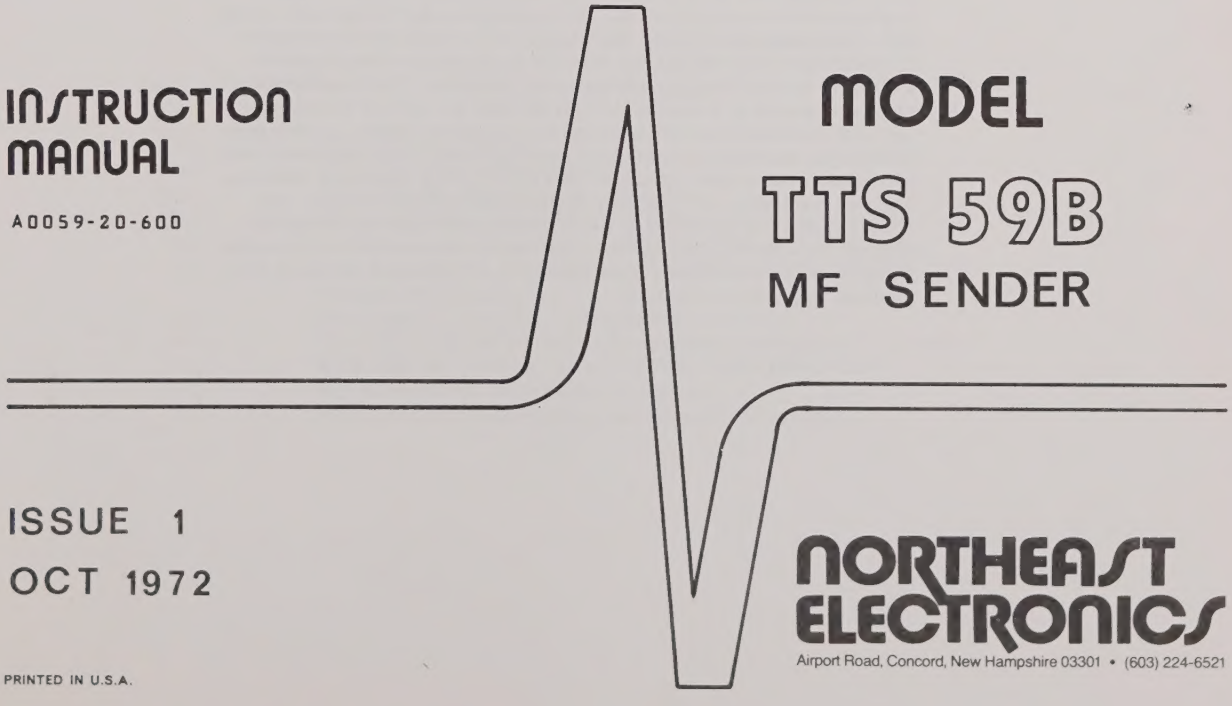

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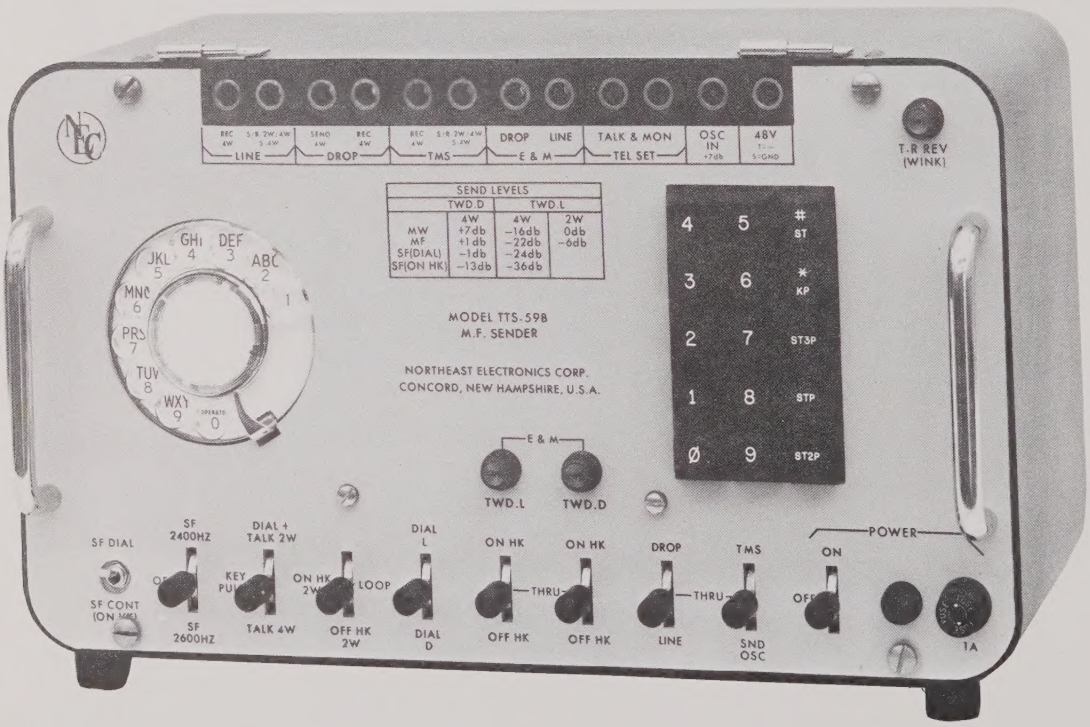


Figure 1-1. TTS 59B MF Sender

SECTION 1

DESCRIPTION

1.1 INTRODUCTION.

1.2 The Northeast Electronics Corporation Model TTS 59B is a portable, solid-state unit that provides MF signals at points in the central office where toll test boards equipped with MF senders are not available. The Model TTS 59B is shown on figure 1-1.

1.3 FUNCTIONS.

1.4 The Model TTS 59B is virtually a test board contained in a portable case. The set provides the means to generate MF, SF, E&M and loop signaling at any point of the circuit and provides complete patch facilities including key switches that control test direction and lamps that indicate supervision status. Jacks are provided for the connection of a headset, an oscillator, a transmission measuring set and patch cords of the standard 310 and 241 variety. A dial is provided on the front panel of the set to be used in conjunction with E&M, loop and SF signaling. The set is also capable of sending two continuous SF tones. On and off hook conditions can be placed on the circuit and a high impedance monitor amplifier is connected across the circuit that permits monitoring without interrupting service. A wink detector lamp provides indications of tip and ring reversals at the far end. The Model TTS 59B is available in a rack mounted version designated as the Model TTS 59BR. Unless otherwise specified, this manual pertains to either version.

1.5 ACCESSORIES.

The Model TTS 59B is normally powered by the 48 volt central office battery. Should it become desirable to power the Model TTS 59B from the 115 V ac line, the Model TTS 26BXPS power supply is available as a cover accessory.

SECTION 2

SPECIFICATIONS

2.1 INTRODUCTION.

2.2 Table 2-1 lists the specifications of the Models TTS 59B Portable and TTS 59BR Rack Mounted MF Senders. Table 2-2 list the specifications of the Model TTS 26BXPS Power Supply Accessory.

Table 2-1. Specifications

OUTPUT FREQUENCIES	MF: 700, 900, 1100, 1300, 1500, and 1700 Hz. SF: 2400 and 2600 Hz.
FREQUENCY ACCURACY	±1%, +15° C to +35° C ±2%, 0° C to +50° C

OUTPUT LEVELS

	TWD. D	TWD. L	
	4W	4W	2W
MW	+7 dBm	-16 dBm	0 dBm
MF	+1 dBm	-22 dBm	-6 dBm
SF DIAL (OFF HK)	-1 dBm	-24 dBm	
SF CONT. (ON HK)	-13 dBm	-36 dBm	

MF AND SF OUTPUT ACCURACY ±1 dB

MF FREQUENCY DISTRIBUTION

Digit	Frequencies (Hz)
1	700 & 900
2	700 & 1100
3	900 & 1100
4	700 & 1300
5	900 & 1300
6	1100 & 1300
7	700 & 1500
8	900 & 1500
9	1100 & 1500
0	1300 & 1500
ST3P	700 & 1700
ST2P	1300 & 1700
STP	900 & 1700

OUTPUT IMPEDANCE	600Ω ±5%
POWER REQUIREMENTS	48 V dc at 400 mA
SIZE	14"w x 8¾"h x 8"d
WEIGHT	17 lb.

The specifications of the Model TTS 59BR are identical to those of the Model TTS 59B with the following exceptions.

SIZE	19"w x 8¾"h x 8"d
WEIGHT	16 lb.

Power Supply Accessory

OUTPUT VOLTAGE	48 V dc
INPUT VOLTAGE	115 Vac
MAX LOAD CURRENT	750 mA
NO LOAD TO FULL LOAD REGULATION	1.5 V dc
FUSES	1 amp input ; 1 amp output
SIZE	3 7/8"w x 7 13/16"h x 5"d (Built into the cover of the Model TTS 59B)
WEIGHT	4 lb. 10 oz.

SECTION 3

OPERATION

3.1 INTRODUCTION.

3.2 Table 3-1 lists the functions of the controls and indicators shown indexed on figure 3-1. Paragraphs 3.3 through 3.23 provide the operating instructions.

3.3 INITIAL PREPARATION.

3.4 The following steps should be taken to prepare the TTS 59B for operation.

a. Unlatch and open the cover. The cover can be detached by sliding it to the right.

b. Connect the central office battery (tip-48 sleeve ground) using a cord equipped with a 310 type telephone plug on one end and a suitable connection on the other.

CAUTION

Connect the power cord to the TTS 59B before it is connected to the power source.

c. Operate the POWER switch to the ON position. The pilot lamp will not light if the polarity of the power is reversed.

d. Take all circuits out of service prior to making tests.

3.5 OPERATION.

3.6 The following procedures are provided for the operation of the Models TTS 59B and TTS 59BR.

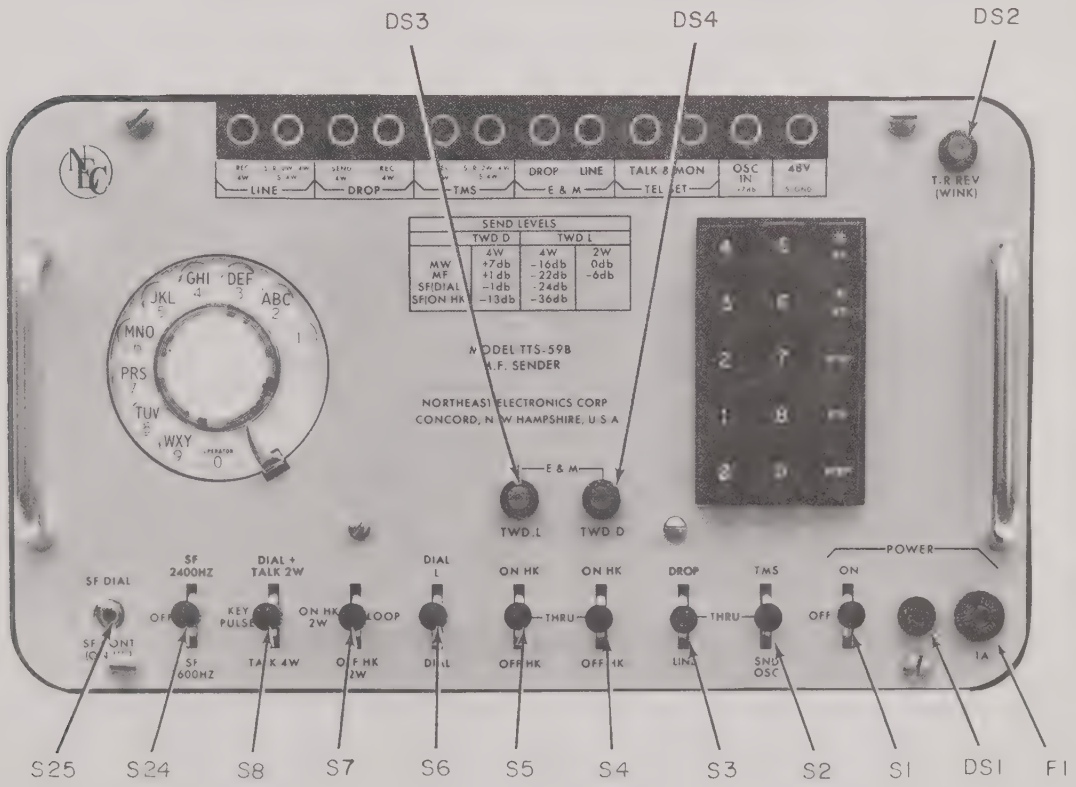


Figure 3-1. TTS 59B Operating Controls

Table 3-1. Operating Controls and Indicators

Ref Desig	Control or Indicator	Functions
S1	POWER switch	When set to ON position, power at 48V connector is applied to unit.
DS1	POWER indicator	When lighted, indicates power is applied to unit.
F1	POWER fuse	Protects internal circuits.
S2	TMS/THRU/SND OSC switch	In TMS position, equipment connected to TMS connectors J7 and J8 is connected to either DROP connectors J9 and J10 or LINE connectors J11 and J12 as determined by DROP/THRU/LINE switch S3. In SND OSC position, signal source connected to OSC IN +7 dB jack J2 is connected to either DROP SEND 4W jack J10 or LINE SND -TLK 2W-4W jack J12 as determined by S3. In THRU position, circuits are readied to allow either MF or SF to be supplied to J10 or J11.
S3	DROP/THRU/LINE switch	In DROP and LINE positions, the switch functions in conjunction with S2 as described above. In THRU position, DROP REC 4W and SEND 4W jacks J9 and J10 are connected to LINE REC 4W and SND-TLK-2W-4W jacks J11 and J12 respectively.
S4	TWD. D OFF HK/THRU/ON HK switch	In OFF HK position and when S6 is in DIAL D position, ground is applied to tip of E&M DROP jack J5. In ON HK position, the ring of E&M DROP jack J5 is opened. In THRU position, J5 tip is connected to J6 tip.
S5	TWD. L OFF HK/THRU ON HK switch	In OFF HK position and when S6 is in DIAL L position, battery is applied to ring of E&M LINE jack J6. In ON HK position, the ring of J6 is grounded. In THRU position, J5 ring is connected to J6 ring.
DS3	TWD. L indicator	When lighted, indicates that circuit connected to E&M LINE jack J6 is busy.
DS4	TWD. D indicator	When lighted, indicates that circuit connected to E&M DROP jack J6 is busy.
S6	DIAL L/DIAL D switch	Functions in conjunction with S4 and S5 as previously described.
S7	OFF HK 2W/ON HK 2W switch	In OFF HK 2W position, seizes line connected to either DROP SEND 4W jack J10 or LINE SND-TLK 2W-4W jack J12 as controlled by S3. In ON HK 2W position, line is released.
S8	DIAL + TALK 2W/KEY PULSE/ TALK 4W switch	In TALK 4W position and when type 52A talkset is connected to TEL SET jacks J3 and J4, operator can talk over circuit connected to either

Table 3-1. Operating Controls and Indicators (cont)

Ref Desig	Control or Indciator	Function
		DROP SEND 4W jack J10 or LINE SND-TLK 2W-4W jack J12 as controlled by S3 and receive on circuit connected to either DROP REC 4W jack J9 or LINE REC 4W jack J11 as controlled by S3. In KEY PULSE pisition, either SF or MF signals are present at either DROP SEND 4W jack J10 or LINE SND-TLK 2W-4W jack J12 as controlled by S3. The MF signals are controlled by the 15 pushbuttons. The SF signals can be either dialed or continuous as controlled by S25 and either at 2400 Hz or 2600 Hz as controlled by S24. In DIAL + TALK 2W position, operator can either dial or talk over circuit connected to either DROP SEND 4W jack J10 or LINE SND-TLK 2W-4W jack J12 as controlled by S3.
S24	SF 2400HZ/OFF/SF 2600 HZ switch	Selects either 2400 Hz or 2600 Hz for SF signaling. In OFF position, SF outputs are disabled.
S25	DIAL SF/CONT SF switch	In DIAL SF position, SF output is controlled by dial. In CONT SF position, SF output is continuous.
DS2	T-R REV (WINK) indicator	Indicator is normally lighted and when far end goes off hook it is not lighted. Can be internally strapped to provide opposite indications.

3.7 LOOP DIALING TOWARDS THE LINE

ACTION	RESULT
a. Operate DROP/THRU/LINE key switch to LINE position.	Connects LINE/SND-TALK 2W-4W jack to dialing circuit.
b. Operate DIAL + TALK 2W key switch to DIAL + TALK 2W position	
c. Connect the circuit under test to the LINE/SND-TALK 2W-4W jack using a cord equipped with a 310 type telephone plug (tip and ring).	
d. Operate ON HK 2W/OFF HK 2W key switch to OFF HK position.	Line seized.
e. Dial desired number	Connects set to circuit under test.

3.8 LOOP DIALING TOWARDS THE DROP

ACTION	RESULT
a. Operate DROP/THRU/LINE key switch to DROP position.	Connects DROP SEND 4W jack to dialing circuit.
b. Operate DIAL + TALK 2W key switch to DIAL + TALK 2W position.	
c. Connect the circuit under test to the DROP SEND 4W jack using a cord equipped with a 310 telephone plug (tip and ring).	
d. Operate LOOP key switch to OFF HK position.	Drop seized.
e. Dial desired number.	Connects set to circuit under test.

3.9 M LEAD DIALING TOWARDS THE LINE

ACTION	RESULT
a. Connect the line and drop of the circuit under test to the E&M LINE AND DROP jacks using a 241 type dual plug.	
b. Operate the DIAL L/DIAL D key switch to DIAL L	
c. Operate the TWD L key switch to OFF HK.	The TWD L indicator lamp will light to show an on hook condition on the E lead of the circuit.
d. Dial the desired number	Battery and open pulses are dialed on the M lead of the circuit towards the line. An optional strap may be added to send battery and ground pulses if desired.
e. If an on hook condition is desired on the line, operate the TWD L key switch to ON HK	An on hook condition is placed on the M lead towards the line.

NOTE : When an off hook condition exists on the E lead, the TWD L lamps will extinguish.

3.10 E LEAD DIALING TOWARD DROP

ACTION	RESULT
a. Connect the line and drop of the circuit under test to the E&M LINE and DROP jacks using a 241 type dual plug.	
b. Operate the DIAL L/DIAL D key switch to DIAL D.	
c. Operate the TWD D key switch to OFF HK	The TWD D indicator lamp will light to show

c. (cont)	an on hook condition on the E lead of the circuit.
d. Dial the desired number	Battery and ground pulses are dialed on the E lead of the circuit towards the drop.
e. If an on hook condition is desired towards the drop, operate the TWD D key switch to the ON HK position	An on hook condition is placed on the E lead of the drop.

3.11 MF OPERATION TOWARDS THE LINE

ACTION	RESULT
a. Operate DROP/THRU/LINE key switch to the LINE	Connects MF generator to the line.
b. Connect the circuit to be tested to the LINE/SND-TALK 2W-4W jack using a 310 type plug (tip and ring)	
c. Operate the DIAL + TALK 2W key switch to the KEY PULSE position.	
d. Operate the ON HK 2W/OFF HK 2W key switch to OFF HK 2W.	Seizes the line.

NOTE : If E or M supervision is desired, connect the E and M leads to the E&M LINE and DROP jacks using a dual 241 type plug.

e. Depress desired MF pushbuttons.	MF key pulsing is placed on the circuit.
f. If an on hook condition is desired on the line, set the ON HK 2W/OFF HK 2W key switch to ON HK 2W	Releases the line.

3.12 MF OPERATION TOWARDS THE DROP

ACTION	RESULT
a. Operate DROP/THRU/LINE key switch to DROP.	Connects the MF generator to the drop.
b. Connect the circuit to be tested to the DROP/SND/4W jack using a 310 type plug (tip and ring)	
c. Operate DIAL + TALK 2W key switch to KEY PULSE.	
d. Operate ON HK 2W/OFF HK 2W key switch to OFF HK 2W.	Seizes the drop.

NOTE : If E and M supervision is desired, connect the E and M leads to the E&M LINE and DROP jacks using a dual 241 type plug.

ACTION	RESULT
e. Depress desired MF pushbuttons.	MF key pulsing is placed on the circuit.
f. If an on hook condition is desired on the line, set the ON HK 2W/OFF HK 2W key switch to ON HK 2W.	Releases the line.

3.13 SF OPERATIONS TOWARDS THE LINE

ACTION	RESULT
a. Operate DROP/THRU/LINE key switch to LINE.	Connects SF generator to the LINE.
b. Connect circuit to be tested to LINE/SND-TLK 2W-4W jack using a 310 type plug (tip and ring)	
c. Operate DIAL + TALK 2W key switch to KEY PULSE	
d. Operate ON HK 2W/OFF HK 2W key switch to OFF HK 2W.	
e. Operate SF 2400 Hz/2600 Hz key switch to desired frequency.	SF generator produces selected frequency.
f. Operate SF DIAL/CONT toggle switch to desired sending mode.	SF is pulsed on the line by the dial in the DIAL position. SF is continuously placed on the line in the CONT position.
g. If an ON hook condition is desired on the line, set the ON HK 2W/OFF HK 2W key switch to ON HK 2W.	Releases the line

3.14 SF OPERATION TOWARDS THE DROP

ACTION	RESULT
a. Operate the DROP/THRU/LINE key switch to DROP.	Connects the SF generator to the drop.
b. Connect the circuit to be tested to the DROP/SND/4W jack using a 310 type plug (tip and ring).	
c. Operate DIAL + TALK 2W key switch to KEY PULSE.	
d. Operate the ON HK 2W/OFF HK 2W key switch to OFF HK 2W.	Seizes the line.
e. Operate the SF 2400 Hz/2600 Hz key switch to desired frequency.	SF generator produces selected frequency.
f. Operate SF DIAL/CONT toggle switch to desired sending mode.	SF is pulled on the drop by the dial in the DIAL position. SF is continuously placed on the line in the CONT position.

g. If an ON hook condition is desired on the drop, set the ON HK 2W/OFF HK 2W key switch to ON HK 2W.	Releases the drop.

3.15 TALKING -2 WIRE TOWARDS THE LINE

ACTION	RESULT
a. Connect the two wire circuit to the LINE/SND-TLK 2W-4W jack using a 310 type plug (tip and ring).	
b. Connect a 52A type headset or equivalent to the TEL SET jacks.	
c. Operate the DROP/THRU/LINE key switch to the LINE.	
d. Operate the KEY PULSE key switch to DIAL + TALK 2W.	
e. Operate the ON HK 2W/OFF HK 2W key switch to OFF HK 2W.	Seizes the line.
f. The set is now prepared for talking on a two wire basis. The talk circuit is powered internally to allow operation on either "wet" or "dry" circuits.	

3.16 TALKING -4 WIRE LINE

ACTION	RESULT
a. Connect the transmit pair of the 4 Wire circuit to the LINE/SND-TLK 2W-4W jack using a 310 type plug (tip and ring).	
b. Connect the receive pair of the 4 wire circuit to the LINE REC 4W jack using a 310 type plug (tip and ring).	
c. Connect a 52A type headset or equivalent to the TEL SET jacks.	
d. Operate the DROP/THRU/LINE key switch to LINE.	
e. Operate the ON HK 2W/OFF HK 2W key switch to OFF HK 2W.	Seizes the line.
f. Operate the KEY PULSE key switch to TALK 4W.	The set is now prepared to talk on a four wire basis.

3.17 TALKING -4W DROP

ACTION	RESULT
a. Connect the transmit pair of the 4 wire circuit to the DROP/SND 4W jack using a	

a. (cont) 310 type plug (tip and ring).	
b. Connect the receive pair of the 4 wire circuit to the DROP/REC 4W jack using a 310 type plug (tip and ring).	
c. Connect a 52A type headset or equivalent to the TEL SET 52A jacks.	
d. Operate the DROP/THRU/LINE key switch to DROP.	
e. Operate the ON HK 2W/OFF HK 2W key switch to OFF HK 2W.	Seizes the drop.
f. Operate the KEY PULSE key switch to TALK 4W.	The set is now prepared for talking on a four wire basis.

3.18 TRANSMISSION MEASUREMENTS 2W LINE

ACTION	RESULT
a. Connect the 2 wire circuit to the LINE/SND-TLK 2W-4W jack using a 310 type plug (tip and ring)	
b. Operate the DROP/THRU/LINE key switch to LINE.	
c. Connect a transmission measuring set to the TMS SND TALK 2W-4W jack using a 310 type plug (tip and ring).	
d. Operate the ON HK 2W/OFF HK 2W key switch to OFF HK 2W.	Seizes the line.
e. Dial or MF key pulse the desired circuit.	Connects set to circuit to be tested.
f. Operate the TMS/THRU/SND OSC key switch to TMS.	Connects transmission measuring set to circuit to be tested. Measurements can be made at this time.

3.19 TRANSMISSION MEASUREMENTS 4 WIRE LINE

ACTION	RESULT
a. Connect the transmit pair of the 4 wire circuit to the LINE SND-TLK 2W-4W jack using a 310 type plug (ring and tip)	
b. Connect the receive pair of the 4 wire circuit to the LINE 4W REC jack using a 310 type plug (tip and ring).	
c. Operate the DROP/THRU/LINE key switch to LINE	

d. Operate the ON HK 2W/OFF HK 2W key switch to OFF HK 2W.	Seizes the line.
e. Connect a transmission measuring set to the TMS REC 4W jack using a 310 type plug (tip and ring).	
f. Dial or MF key pulse the desired circuit.	Connects set to circuit to be tested.
g. Operate TMS/THRU/SND OSC key switch to TMS.	Connects transmission measuring set to circuit to be tested. Measurements can be made at this time.

3.20 TRANSMISSION MEASUREMENTS 4 WIRE DROP

ACTION	RESULT
a. Connect the transmit pair of the 4 wire circuit to the DROP/SND 4W jack using a 310 type plug (tip and ring).	
b. Connect the receive pair of the 4 wire circuit to the DROP/REC 4W using a 310 type plug (tip and ring).	
c. Operate the DROP/THRU/LINE key switch to drop.	
d. Operate the ON HK 2W/OFF HK 2W key switch to OFF HK 2W.	Seizes the drop.
e. Dial or MF key pulse the desired circuit.	Connects the set to the circuits to be tested.
f. Operate TMS/THRU/SND OSC key switch to TMS.	Connects the transmission measuring set to the circuit to be tested. Measurements can be made at this time.

3.21 SENDING : A TONE TOWARDS THE LINE

ACTION	RESULT
a. Connect external oscillator (600Ω) to the OSC IN +7 dB jack using a 310 type plug (tip and ring)	
b. Operate DROP/THRU/LINE key switch to LINE.	
c. Operate TMS/THRU/SND/OSC key switch to SND OSC.	
d. Operate ON HK 2W/OFF HK 2W key switch to OFF HK 2W	Seizes the line. Now sending a 0 dBm towards the line on the LINE SND+ TALK 2W-4W jack on a two wire basis. -16 dBm on a four wire basis.

3.22 SENDING : OSC TOWARDS THE DROP

ACTION	RESULT
a. Connect external oscillator (600Ω) to the OSC IN +7 dBm jack using a 310 type plug (tip and rign).	
b. Operate DROP/THRU/LINE key switch to DROP.	
c. Operate TMS/THRU/SND OSC key switch to SND OSC.	
d. Operate ON HK 2W/OFF HK 2W key switch to OFF HK 2W.	Seizes the drop. Now sending +7 dBm towards the drop on the DROP/SND 4W jack.

3.23 T-R REV (WINK) LAMP

The purpose of the Wink lamp is to signify that the necessary conditions exist at the far end dialing. Tip and ring reversals are detected by the wink detector, contained within the TTS 59B, or TTS 59BR which lights the wink lamp and provides the indication mentioned above.

SECTION 4

CIRCUIT DESCRIPTION.

4.1 INTRODUCTION.

4.2 Paragraphs 4.3 and 4.4 provide the overall block diagram level description of the TTS 59B and paragraphs 4.5 through 4.12 provide the detailed circuit descriptions. Paragraph 4.13 contains a description of the TTS 26BXPS power supply accessory.

4.3 BLOCK DIAGRAM DESCRIPTION.

4.4 As shown on figure 4-1, the TTS 59B MF Sender basically consists of MF and SF generators, an output amplifier, and multiple switching functions. The output can be sent toward the line or toward the drop and the SF output can be continuous or dialed at either 2400 Hz or 2600 Hz. Standard MF frequencies of 700 Hz to 1700 Hz in 200 Hz increments are selected by the pushbutton pad.

4.5 DETAILED CIRCUIT DESCRIPTION.

4.6 Circuit descriptions are provided for the MF and SF generators, the output buffer amplifiers, and the monitor amplifier. See figure 7-1 for the overall interconnection diagram.

4.7 MF GENERATOR AND CONTROLS.

4.8 This functional section (figure 7-2) consists of six identically designed oscillators, 15 pushbuttons and associated diode gates and a common output amplifier. The 700 Hz oscillator is described as a typical example. Transistors Q603 in conjunction with L601, C603, and C604 forms an L-C oscillator. When none of the buttons are pressed, R601 is removed from the base circuit of Q601 and this stage is cut off. The -24 volts applied through R603 keeps FET gate Q602 pinched off and blocks the tone output. When either of the 1,2,4,7, or STP buttons is pressed, ground is applied through the associated diode to one end of R601. This raises the voltage at the base of Q601 enough to saturate it and apply -48 volts to the gate of Q602. The FET gate conducts and passes the MF tone to a common output bus line. The tone frequency is adjusted by L601 and the level by R606. A three-stage output amplifier consisting of common emitter stages Q2 and Q3 and emitter follower Q1 provides the necessary gain and isolation. The floating output is furnished by transformer T1.

4.9 SF GENERATOR.

4.10 The SF generator (figure 7-1), comprised of stages Q701, Q702, and Q703 is nearly identical to the MF generator described in paragraph 4.7. When S25 is set to SF CONT, ground is applied through one half of S25 to R701 and the SF generator supplies a continuous output. When S25 is set to SF DIAL and dial S9 is operated, relay K702 pulses ground through S24 to provide a pulsed SF output. When S24 is in the 2600 Hz position, C703, C704, and L701 determine the 2600 Hz output frequency. In the 2400 Hz position of S24, C705 and C706 are added in parallel to reduce the SF output frequency to 2400 Hz. The SF generator output at PC2-15 is applied to the output amplifier on the MF generator circuit board.

4.11 MONITOR AMPLIFIER.

4.12 The monitor amplifier (figure 7-1) consists of two impedance matching transformers and an amplifier. Transformers T302 and T303 couple the send and receive signals to potentiometers R312 and R313 used to adjust the volume levels. Operational amplifier U301 provides approximately 13 dB of gain to the signal at the wipers of the volume adjustments. Output stage Q301 provides additional amplification to the signal applied to telephone set jacks J3 and J4 through a normally open set of K306 contacts.

4.13 POWER SUPPLY (TTS 26BXPS).

4.14 See figure 7-3 for the schemtaic diagram. The ac voltage at the secondary of T1 is applied to full wave bridge rectifier CR1 through CR4. The resulting dc voltage is filtered by C1A, C1B, and R4 and applied to the regulator circuit. The circuit configuration is a Darlington-connected emitter follower type regulator with the reference voltage supplied by CR5 and CR6. The approximate -48 volt output is applied to J1 through fuse F2.

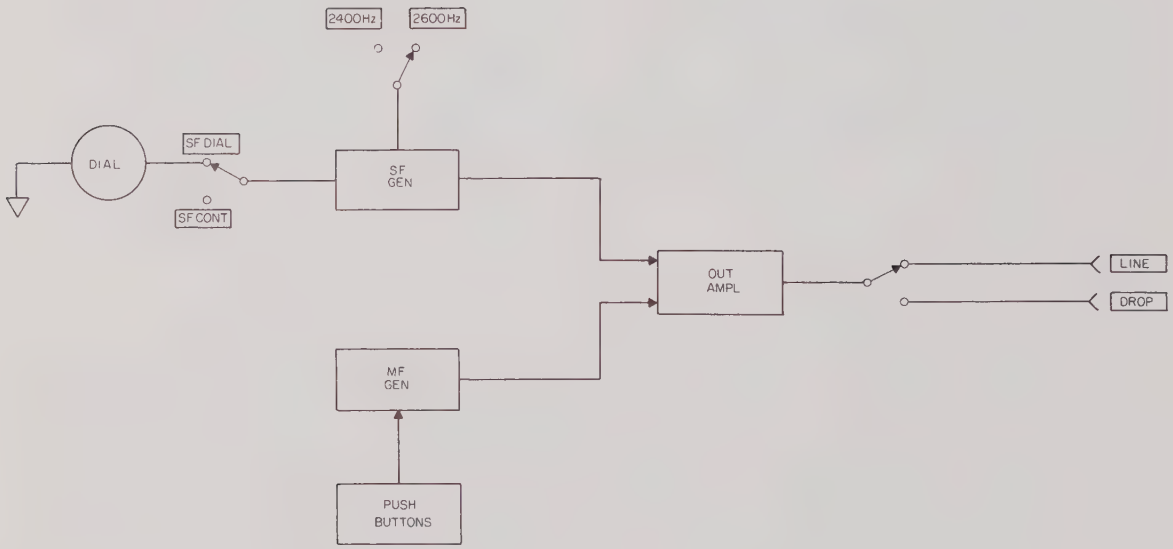


Figure 4-1. TTS 59B Simplified Block Diagram

SECTION 5

MAINTENANCE AND CALIBRATION

5.1 INTRODUCTION.

5.2 Paragraphs 5.3 through 5.12 provide the calibration procedures for Models TTS 59B and TTS 59BR, while the general maintenance instructions are provided by paragraphs 5.13 and 5.14.

5.3 CALIBRATION.

5.4 The following calibration procedures are provided for the MF generator frequencies and output levels, the SF generator frequencies and output levels and the monitor amplifier listening levels.

5.5 TEST EQUIPMENT REQUIRED.

5.6 The following test equipment is required to calibrate the Models TTS 59B and TTS 59BR:

a. An ac voltmeter that is calibrated into 600Ω and displays readings in dBm, such as the HP 400 FL or equivalent.

b. A high impedance VTVM such as the HP 427A or equivalent. HP 3400A RMS VM

c. An audio oscillator such as the HP 204D or equivalent.

d. A frequency counter such as the NEC TTS 80C or equivalent.

5.7 MF GENERATOR CALIBRATION.

5.8 To calibrate the MF generator, perform the following steps :

a. Connect the 48 volt power source to the 48V power observing the proper polarity (tip = neg. sleeve = pos.)

b. Set POWER to ON.

c. Set DROP/THRU/LINE switch to DROP.

d. Set remaining switches to center position.

e. Connect ac voltmeter and frequency counter to DROP 4W SND jack. with 600Ω load

f. Place MF generator card (PC-1) on extender card provided.

g. Ground pin 6 on PC-1

h. Adjust R12 on PC1 to obtain maximum reading on ac voltmeter.

i. Adjust R606 on PC1 to obtain a reading of +1 dBm on ac voltmeter.

j. Adjust L601 to obtain a reading of 700 Hz (±1%) on the frequency counter.

k. Recheck steps h, i and j to insure the accuracy of the calibration.

l. Remove ground from pin 6 and ground pin 7.

m. Adjust R406 to obtain a reading of +1 dBm on the ac voltmeter.

n. Adjust L401 to obtain a reading of 900 Hz (±1%) on the frequency counter.

o. Recheck steps m and n to insure the accuracy of the calibration.

p. Remove ground from pin 7 and ground pin 8.

q. Adjust R206 to obtain a reading of +1 dBm on the ac voltmeter.

r. Adjust L201 to obtain a reading of 1100 Hz (±1%) on the frequency counter.

s. Recheck steps q and r to insure the accuracy of the calibration.

t. Remove ground from pin 8 and ground pin 9.

u. Adjust R506 to obtain a reading of +1 dBm on ac voltmeter.

v. Adjust L501 to obtain a reading of 1300 Hz (±1%) on the frequency counter.

w. Recheck steps u and v to insure the accuracy of the calibration.

x. Remove ground from pin 9 and ground pin 10.

y. Adjust R306 to obtain a reading of +1 dBm on the ac voltmeter.

z. Adjust L301 to obtain a reading of 1500 Hz (±1%) on the frequency counter.

aa. Recheck steps y and z to insure the accuracy of the calibration.

ab. Remove ground from pin 10 and ground pin 11.

ac. Adjust R106 to obtain a reading of +1 dBm on the ac voltmeter.

ad. Adjust L101 to obtain a reading of 1700 Hz (±1%) on the frequency counter.

ae. Recheck steps ac and ad to insure the accuracy of the calibration.

af. Remove ground from pin 11.

ag. Hold 0 button on MF keypad depressed and adjust R12 to obtain a reading of +1 dBm on the ac voltmeter.

ah. Hold each MF keypad button depressed in turn and observe a reading of +1 dBm (±0.5 dBm) on each measurement.

5.9 SF GENERATOR CALIBRATION.

5.10 To calibrate the SF Generator, perform the following steps.

a. Connect 48-volt power supply to 48V power jack.

b. Set POWER switch ON.

c. Set DROP/THRU/LINE switch to DROP.

d. Set SF DIAL/SF CONT switch to SF CONT.

e. Set SF 2400 HZ/SF2600 HZ switch to SF 2400 HZ.

f. Set all other switches to center position.

g. Connect Ac Voltmeter and Frequency Counter to DROP 4W SEND jack. with 600Ω load

h. Place SF Generator and Relay Circuit Board on extender card provided.

i. On PC2, adjust L701 to obtain an indication of 2400 Hz ±1% on Frequency Counter.

j. Adjust R706 to obtain an indication of -13 dBm on Ac Voltmeter.

k. Set SF 2400 HZ/SF 2600 HZ switch to SF 2600 HZ.

l. If Frequency Counter indication is 2600 Hz ±1%, proceed to step 13. If it is not, alternately set SF 2400 HZ/SF 2600 HZ switch to the two positions and adjust L701 to obtain the best compromise that results in frequency counter indications of 2400 Hz ±1% and 2600 Hz ±1%.

m. Set SF 2400 HZ/SF 2600 HZ switch to SF 2600 HZ.

n. If Ac Voltmeter indication is -13 dBm ±1 dBm the calibration is completed. If it is not, alternately set SF 2400 HZ/SF 2600 HZ switch to the two positions and adjust R706 to obtain the best compromise indication of -13 dBm ±1 dBm at the two positions.

5.11 MONITOR AMPLIFIER LISTENING LEVEL CALIBRATION.

5.12 To calibrate the dual channel monitor amplifier, perform the following steps.

a. Connect 48-volt power supply to 48Vjack

b. Set POWER switch to ON.

c. Set TMS/THRU/SND OSC switch to SND OSC.

d. Set DROP/THRU/LINE switch to LINE.

e. Set all remaining switches to center positions.

f. Connect 1000 Hz, +7 dBm, 600Ω source to OSC IN +7 dB jack.

g. Connect VTVM across sleeves of TEL SET 52A jacks. plug in headset

h. Adjust ~~R313~~ 310 to obtain an indication of 0.15 volts rms on VTVM.

i. Set DROP/THRU/LINE switch to DROP.

j. Adjust ~~R313~~ 311 to obtain an indication of 0.15 volts rms on VTVM.

5.13 MAINTENANCE.

5.14 Should maintenance become necessary, the information provided in section 4 of this manual coupled with the voltage levels appearing on the schemtaics contained in section 7 and standard troubleshooting methods should facilitate the repair of the instrument.

SECTION 6

ELECTRONIC PARTS LIST

6.1 INTRODUCTION.

6.2 Table 6-1 provides a list of FSCM (Federal Supply Code of Manufacturers) code numbers and corresponding manufacturers. Table 6-2 through 6-8 are the parts list for the TTS 59B MF Sender.

Table 6-1. List of Manufacturers

Code No.	Manufacturer
01121	Allen Bradley Milwaukee, Wis. 53204
01295	Texas Instrument Inc. Dallas, Texas 75231
02660	Amphenol Corp. Broadview, Ill. 60153
04221	Midtex Inc. Mankato, Minn. 56001
05397	Union Carbide Corp. N.Y., N. Y. 10017
09353	C&K Components Inc. Newton, Mass. 02158
12065	Transitron Electronic Corp. Boston, Mass. 02128
13606	Sprague Electric Co. Concord, N. H. 03301
17803	Fairchild, Mountain View, Calif. 94041
19701	Electra/Midlands Mineral Wells, Texas 76067
27735	Fydne Electric Co. Fairfield, Conn. 06430
49671	RCA Corp. N.Y., N. Y. 10020
53201	Sangamo Electric Co. Springfield, Ill. 62705
71400	Bussman St. Louis, Mo. 63017
71450	CTS Corp. Elkhart, Ind. 45614
71590	Centralab Milwaukee, Wis. 53201
72982	Erie Technological Products Erie, Pa. 16512
73138	Beckman Instruments Heli-Pot Div. Fullerton, Calif. 92634
78277	Sigma Instruments So. Braintree, Mass. 02185
80223	United Transformer Co. N.Y., N. Y. 10013
80368	Sylvania Electric Inc. N.Y., N. Y. 10017
81071	Schauer Mfg. Co., Cincinnati, Ohio 45242
82389	Switchcraft Inc. Chicago, Ill. 60630
86632	Newton Engineering Newton, Mass. 02161
90201	Mallory Capacitor Indianapolis, Ind. 46206
91506	Augat Inc. Attleboro, Mass. 02703
91662	Elco Corp. Willow Grove, Pa. 19090

Table 6-2. TTS 59B Overall Parts List

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
CR1	00 200V	12065	1N4003	560040030
PC1	E-95648 PC BD			A005911006
PC2	ASSY CARD 2			A005920010
PC3	ASSY CARD 3			A005920011
PC5	EXTENDER CARD E95205			A008510027
RV1	SILICON	81071	SV-1	565510000

Table 6-3. Jack Block Assembly Parts List

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
J1	SPECIAL 00	82389	5J-1194	650401200
J2	JACK,TEL,SWCRFT SCHEM 14	SWCRFT	MT-336A	650402300
J3	SAME AS J1			
J4	SAME AS J1			
J5	TEL.TYPE SCHEM2	82389	5J-1329	650401300
J6	SAME AS J5			
J7	SAME AS J5			
J8	SAME AS J5			
J9	SAME AS J5			
J10	SAME AS J5			
J11	JACK,TEL,SWCRFT SCHEM 22	SWCRFT	MT336C	650402200
J12	SAME AS J5			

Table 6-4. MF Generator Assembly (E95648) Parts List

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
102	PC MTG	91662	05-3303	826600100
202	SAME AS 102			
302	SAME AS 102			
402	SAME AS 102			
502	SAME AS 102			
602	SAME AS 102			
C2	6.8MF 10% 20V	05397	T330A685K020AS	310006850
C3	SAME AS C2			
C4	SAME AS C2			
C101	.1MF 10% 50V	05397	T330A104K050AS	310001040
C102	SAME AS C2			
C103	.04MF 10% 100V	13606	225P40391WB3	320004030
C104	SAME AS C103			
C201	SAME AS C101			
C202	SAME AS C2			
C203	091UF 10% 100V	13606	225P91391	320009130
C204	SAME AS C203			
C301	SAME AS C101			
C302	SAME AS C2			
C303	.056MF 10% 100V	13606	225P56391	320005630
C304	SAME AS C303			

Table 6-4. MF Generator Assembly (E95648) Parts List (cont)

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C401	SAME AS C101			
C402	SAME AS C2			
C403	.15MF 10% 75V	13606	225P1549R75	320001540
C404	.12MF 10% 75V	13606	225P1249R75	320001240
C501	SAME AS C101			
C503	.068MF 10% 100V	13606	225P68391	320006830
C504	SAME AS C503			
C601	SAME AS C101			
C603	.22MF 10% 75V	13606	225P2249R75	320002240
C604	SAME AS C603			
CR1	A21 80MW 00 80V	12065	1N198	561001980
CR2	DO35 500MW 00 20V	12065	1N4148	560041480
CR3	SAME AS CR1			
CR4	SAME AS CR2			
CR5	SAME AS CR1			
CR6	SAME AS CR1			
CR7	SAME AS CR2			
CR8	SAME AS CR1			
CR9	SAME AS CR2			
CR10	SAME AS CR1			
CR11	SAME AS CR1			
CR12	SAME AS CR2			
CR13	SAME AS CR2			
CR14	SAME AS CR1			
CR15	SAME AS CR1			
CR16	SAME AS CR2			
CR17	SAME AS CR2			
CR18	SAME AS CR1			
CR19	SAME AS CR2			
CR20	SAME AS CR1			
CR21	SAME AS CR1			
CR22	SAME AS CR2			
CR23	SAME AS CR2			
CR24	SAME AS CR1			
CR101	SAME AS CR1			
CR201	SAME AS CR2			
CR301	SAME AS CR2			
CR401	SAME AS CR2			
CR501	SAME AS CR2			
CR601	SAME AS CR2			
L101	INDUCTOR,VAR, 475-525MH	53021	NV-245-36370	455100100
L201	SAME AS L101			
L301	SAME AS L101			
L401	SAME AS L101			
L501	SAME AS L101			
L601	SAME AS L101			
Q101	TO92AFA 310MW 00 400V	17803	2N3569	550035690
Q102	TO92 -15MA 00 25V	01295	2N3820TO	555038200
Q103	SAME AS Q101			
Q201	SAME AS Q101			
Q202	SAME AS Q102			
Q203	SAME AS Q101			
Q301	SAME AS Q101			
Q302	SAME AS Q102			
Q303	SAME AS Q101			
Q401	SAME AS Q101			
Q402	SAME AS Q102			
Q403	SAME AS Q101			
Q501	SAME AS Q101			
Q502	SAME AS Q102			

Table 6-4. MF Generator Assembly (E95648) Parts List (Cont)

REFERENCE DESIGNATOR	DESCRIPTION		MFGR.	MFGR. PART NO.	N.E.C. PART NO.
Q503	SAME AS Q101				
Q601	SAME AS Q101				
Q602	SAME AS Q102				
Q603	SAME AS Q101				
R1	EL.VAL.	1/2W	01121	EB	200200000
R2	2K	1/2W 5%	01121	TYPE EB	200202025
R3	820-	1/4W 10%	01121	TYPE CB	200108216
R4	4.7K	1/4W 10%	01121	TYPE CB	200104726
R5	8.2K	1/4W 10%	01121	TYPE CB	200108226
R6	82K	1/4W 10%	01121	TYPE CB	200108236
R7	680-	1/4W 10%	01121	TYPE CB	200106816
R8	SAME AS R4				
R9	27K	1/4W 10%	01121	TYPE CB	200102736
R10	270K	1/4W 10%	01121	TYPE CB	200102746
R11	SAME AS R4				
R12	5K	.25W 00	90201	MTC53L1	231205020
R13	205-	1/8W .5%	19701	MF5C	220320507
R101	200K	1/2W 5%	01121	TYPE EB	200202045
R102	20K	1/2W 5%	01121	TYPE EB	200202035
R103	SAME AS R102				
R105	2.003K	1/8W 1%	19701	MF5C	220220011
R106	SAME AS R12				
R107	7680-	1/8W 1%	19701	MF5C	220276811
R108	330-	1/2W 10%	01121	TYPE EB	200203316
R109	43.2K	1/8W 1%	19701	MF5C	220243221
R110	SAME AS R109				
R201	SAME AS R101				
R202	SAME AS R102				
R203	SAME AS R102				
R205	SAME AS R105				
R206	SAME AS R12				
R207	SAME AS R107				
R208	SAME AS R108				
R209	SAME AS R109				
R210	SAME AS R109				
R301	SAME AS R101				
R302	SAME AS R102				
R303	SAME AS R102				
R305	SAME AS R105				
R306	SAME AS R12				
R307	SAME AS R107				
R308	SAME AS R108				
R309	SAME AS R109				
R310	SAME AS R109				
R401	SAME AS R101				
R402	SAME AS R102				
R403	SAME AS R102				
R405	SAME AS R105				
R406	SAME AS R12				
R407	SAME AS R107				
R408	SAME AS R108				
R409	SAME AS R109				
R410	SAME AS R109				
R501	SAME AS R101				
R502	SAME AS R102				
R503	SAME AS R102				
R505	SAME AS R105				
R506	SAME AS R12				
R507	SAME AS R107				
R508	SAME AS R108				
R509	SAME AS R109				
R510	SAME AS R109				
R601	SAME AS R101				

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R602	SAME AS R102			
R603	SAME AS R102			
R605	SAME AS R105			
R606	SAME AS R12			
R607	SAME AS R107			
R608	SAME AS R108			
R609	SAME AS R109			
R610	SAME AS R109			
T1	P600CT S600SPL AUDIO PC	80223	S0-15P	400300200

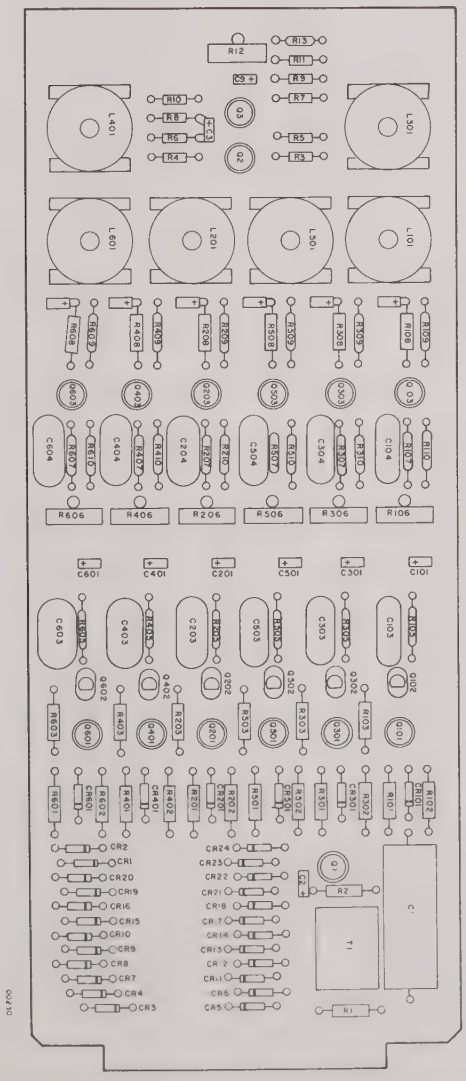


Figure 6-1. MF Generator Assembly (E95648), Component Location

Section 6 Table 6-5. Circuit Card 2 Assembly (E95596) Parts List

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C701	1MF 10% 100V	13606	225P10591	320001050
C702	6.8MF 10% 20V	05397	K6R8C20K	310206850
C703	SELVAL 10% V	13606	225P	320000000
C704	SAME AS C703			
C705	SAME AS C703			
C706	SAME AS C703			
CR1	00 200V	12065	1N4003	560040030
CR701	SAME AS CR1			
CR702	SAME AS CR1			
CR703	SAME AS CR1			
CR704	SAME AS CR1			
CR705	SAME AS CR1			
CR706	SAME AS CR1			
CR707	A-1 400MW 5% 12V	12065	1N759A	562007591
CR708	SAME AS CR707			
CR709	SAME AS CR1			
CR710	SAME AS CR1			
CR711	SAME AS CR1			
K701	6.56K 00 24V	78277	65FP1A-24	604300300
K702	00 48V	AE-NIPPON	PD1400A22-MR11N58	600600500
K703	.41K 00 6V	78277	65FP1A-6	604300100
K704	SAME AS K703			
L701	INDUCTOR,VAR, 475-525MH	53021	NV-245-36370	455100100
Q701	TO92AFA 310MW 00 400V	17803	2N3569	550035690
Q702	TO92 -15MA 00 25V	01295	2N3820TO	555038200
Q703	SAME AS Q701			
QX701	PC MTG	91662	05-3303	826600100
QX702	SAME AS QX701			
QX703	SAME AS QX701			
R701	220K 1/2W 10%	01121	TYPE EB	200202246
R702	22K 1/2W 10%	01121	TYPE EB	200202236
R703	SAME AS R702			
R705	EL.VAL. 1/2W	01121	EB	200200000
R706	5K .25W 00	71450	UPE200RE1-SQ8516	231305020
R707	7680- 1/8W 1%	19701	MF5C	220276811
R708	330- 1/2W 10%	01121	TYPE EB	200203316
R709	43.2K 1/8W 1%	19701	MF5C	220243221
R710	SAME AS R709			
R711	1K 3W 5%	13606	242E1025	210301025
R712	5.6K 1/2W 10%	01121	EB	200205626
R713	500# 3W 5%	13606	242E5015	210305015

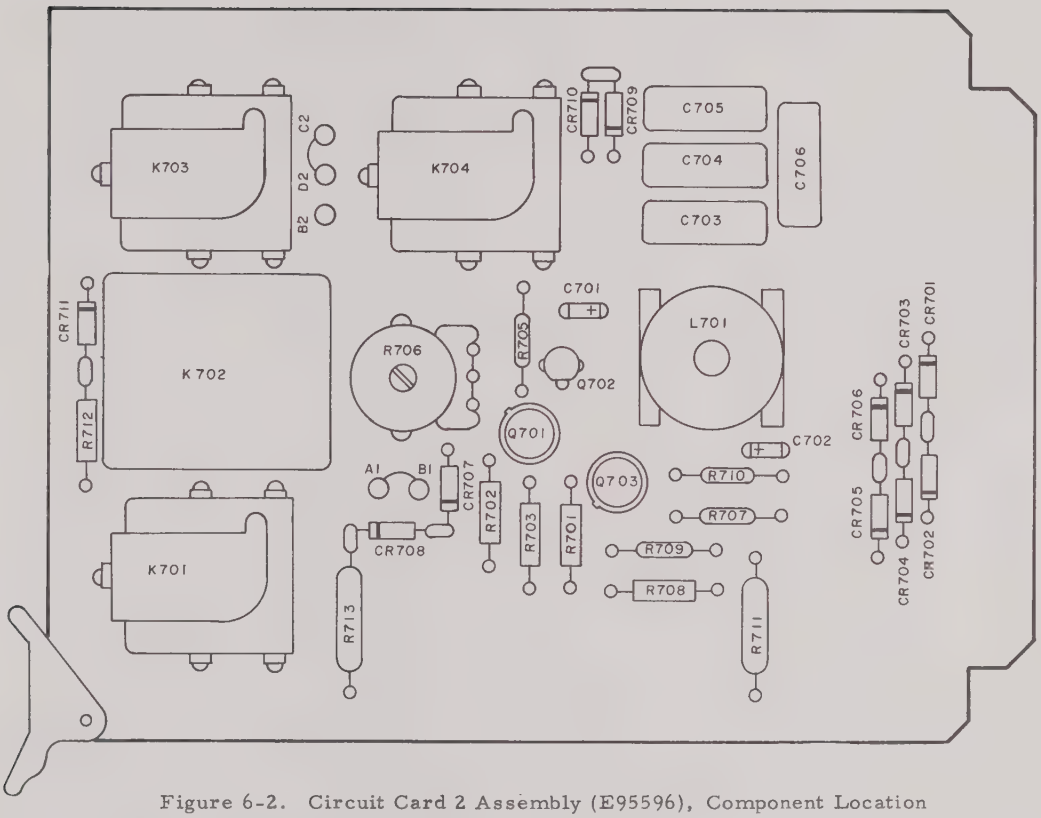


Figure 6-2. Circuit Card 2 Assembly (E95596), Component Location

Table 6-6. L and D Control and Monitor Amplifier Assembly (E95952) Parts List

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C301	2MF 00 200V	27735	D-2.0-200-10	301302050
C302	SAME AS C301			
C303				3002020610
C304	SAME AS C301			
C305	SAME AS C301			
C306	.1MF 20% 500V	13606	5GA-P10	330401040
C307	SAME AS C306			
C308	SAME AS C303			
C309	.1UF 20% 35V	13606	196D104X0035HA1	310801040
C310	560PF 10% 1KV	71590	DD-561	330005610
C311	15PF 10% 1KV	71590	DD-150	330001500
C312	10MF 10% 20V	13606	150D106X9020B2	310301060
C313	20MF 00 50V	13606	TE1305	300202061
C314	2.2UF 20% 50V	72982	8141-050-651-225M	330802250
C315	.01UF 20% 200V	VITRAMON	VK37BW103M	331001030
C316	10UF 50V	SPRAGUE	TE1304	300201061
C317	SAME AS C316			
CR301				5600400300
CR302	SAME AS CR301			
CR303	SAME AS CR301			
CR304	SAME AS CR301			
CR305	SAME AS CR301			

Table 6-6. L and D Control and Monitor Amplifier Assembly (E95952) Parts List (cont)

REFERENCE DESIGNATOR	DESCRIPTION				MFGR.	MFGR. PART NO.	N.E.C. PART NO.
K301			00	48V	AE-NIPPON	PD1400A22-MR11N58	600600500
K302	SAME AS K301						
K303							6006005000
K304	SAME AS K303						
K305	SAME AS K301						
K306	SAME AS K301						
K307	SAME AS K303						
K308	SAME AS K301						
Q301	TO5MSS	1W	00	40V	49671	2N3053	550030530
QX301	PC MTG				91662	05-3303	826600100
R301	600-	1/8W	1%		19701	MF5C	220260001
R302	SAME AS R301						
R303	1.2K	3W	5%		13606	242E1225	210301225
R304	232-	1/8W	1%		19701	MF5C	220223201
R305	SAME AS R304						
R306	604-	1/8W	1%		19701	MF5C	220260401
R307	432	1/8W	1%		19701	MF5C	220243201
R308	SAME AS R307						
R309	SAME AS R301						
R310	10K	.75W	10	%	73138	89PR10K	232501030
R311	SAME AS R310						
R312	27K	1/2W	10%		01121	TYPE EB	200202736
R313	SAME AS R312						
R314							2002047360
R315	1.5K	1/2W	10%		01121	TYPE EB	200201526
R316	47-	1/2W	10%		01121	TYPE EB	200204706
R317	330K	1/2W	10%		01121	TYPE EB	200203346
R318	220K	1/2W	10%		01121	TYPE EB	200202246
R319	SAME AS R318						
R320	22K	1/2W	10%		01121	TYPE EB	200202236
R321							2002010360
R322	1K	1/2W	10%	200V	73138	62P1K	232701026
R323	100-	1/2W	10%	200V	HILIPOT	62P100	232701016
R324	10K	1/2W	10%		01121	TYPE EB	200201036
R325	560-	1/2W	10%		01121	TYPE EB	200205616
R326	SAME AS R325						
R327	1K	1/2W	10%		01121	TYPE EB	200201026
R328	100-	1/2W	10%		01121	TYPE EB	200201016
RV301	SILICON				81071	SV-1	565510000
T301	TALK COIL				CECO	CE-104A	450100100
T302					04221	MT-7F8	400100600
T303	SAME AS T302						
U301	14DILP		00		01295	SN72709N14P	500007090
UX301	14PDIL		00		91506	583509-1	820100300

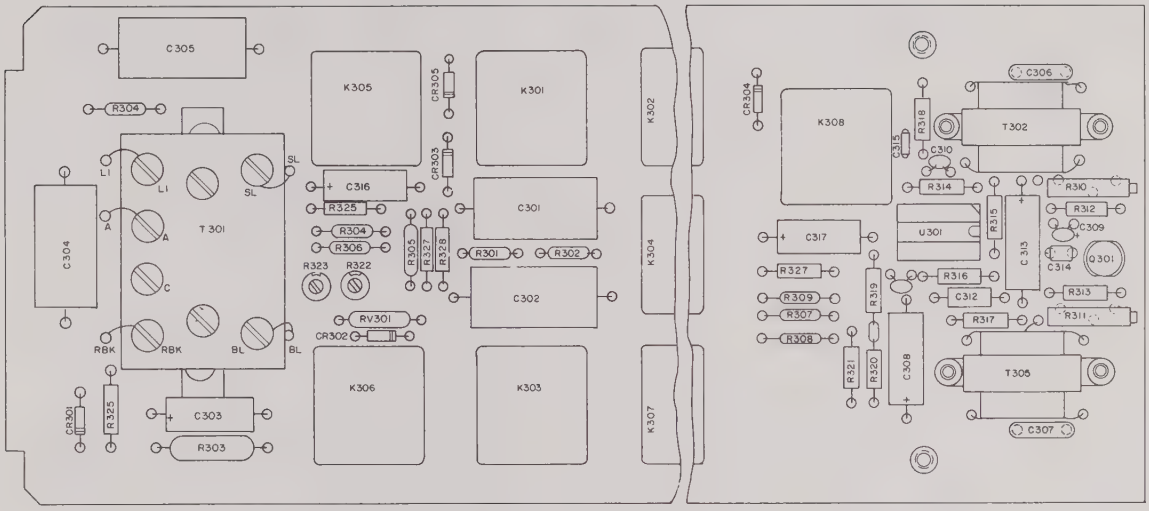


Figure 6-3. L and D Control and Monitor Amplifier Assembly (E95952), Component Location

Table 6-7. Sub-Panel Assembly Parts List

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
DS1	40MA 00 48V	80368	30941-0	730001800
DS2	SAME AS DS1			
DS3	SAME AS DS1			
DS4	SAME AS DS1			
F1	1A 00 250V	71400	MDL	863101400
PC4	SW PAD ASSEM 95971			A005920028
S1	1A 00 125V GEN CONT		MCT4-T4	630200700
S2	1A 125V GEN.CONT		MCT4-T1	630201500
S3	1A 125V GEN.CONT		MCT4-T1	630201600
S4	1A 00 125V GEN CONT		MCT4-T1	630200300
S5	SAME AS S4			
S6	SAME AS S4			
S7	SAME AS S1			
S8	1A 125V GEN.CONT		MCT4-T1	630201400
S24	1A 00 125V GEN CONT		MCT4-T1	630200600
S25	DPDT 5A 00 28V	09353	7201P	620400600
XDS1	SOCKET,CART LAMP,SHORT	80368	SM-1	828002000
XDS2	SAME AS XDS1			
XDS3	SAME AS XDS1			
XDS4	SAME AS XDS1			
XF1	FUSEHOLDER,3AG PANEL	71400	HKP	863000100

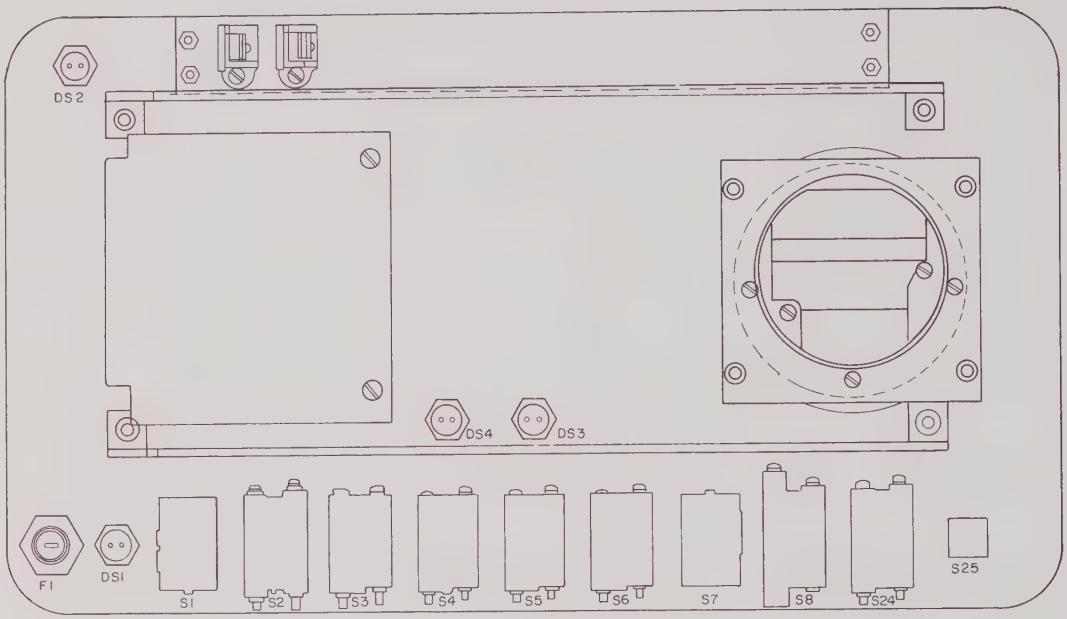


Figure 6-4. Sub-Panel Assembly, Component Location

Table 6-8. Card Cage Assembly Parts List

REFERENCE DESIGNATOR	DESCRIPTION	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
L1	4H 00	86632	TN-1274	450200200
PC1X	5A 00 600V	02660	225-21821-101	651700900
PC2X	5A 00 600V	02660	225-22221-101	651701000
PC3X	SAME AS PC1X			
PC4X	SAME AS PC1X			
RT1	LAMP,RES,81-PIN	80368	GB-13A	730100100

Table 6-9. TTS 26BXPS Overall Parts List

REFERENCE DESIGNATOR	DESCRIPTION VALUE POWER TOL	MFGR	MFGR PART NO.	N.E.C. #
F1 and F2	Fuse	Littelfuse	3AG	863100400
XF1 and XF2	Fuse	Bussman	HKP	863000100
J1	Jack teltype schem 2	Swcrft	L12A	650100100
J2	Jack metal gnd	HH Smith	137SP	652500100
J3	Jack red, PS101 only	Grayhill	29-1R	652400400
J4	Jack black, PS101only	Grayhill	29-1B	652400300
P1	Plug 3-pin male recept gnd	Swcrft	AC3G	652300100
Q2	Transistor	Bendix	2N136A	553011361
T1	Transformer	Signal	56-1	420500100

Table 6-10. TTS 26BXPS Circuit Card Parts List

REFERENCE DESCRIPTION	DESCRIPTION VALUE POWER TOL	MFGR	MFGR PART NO.	N.E.C. #
C1A, C1B	C: 300μF, 10%, 100V	Sprague	34D	301403071
C2	C: 100μF, 10%, 500V	IEI	APD127	300901072
CR1-CR4	Diode	Transtron	1N4004	560040040
CR5 and CR6	Diode	Dickson	1N3029B	562030292
Q1	Transistor	TI	2N1375	553013750
R1	R: 10K, 10%, 5W	AB	Type CB	200101036
R2	R: 1.5K, 10%, 5W	AB	Type CB	200201526
R3	R: 10K, 10%, 5W	AB	Type CB	200202036
R4	R: 1Ω, 5%, 1W	Sprague	239E1R05	210200105
R5	R: 2.2K, 5%, 5W	AB	Type EB	200202225

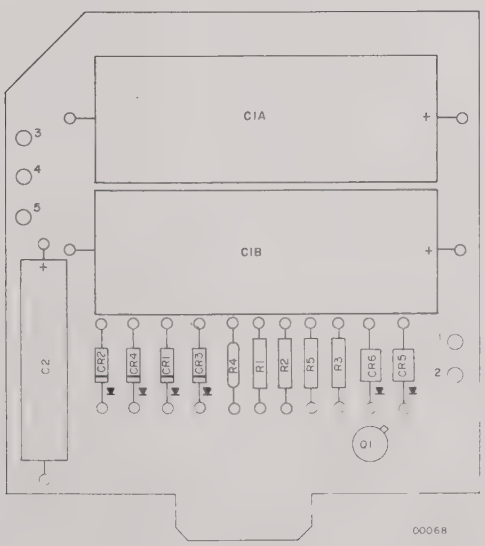


Figure 6-5. TTS 26BXPS Power Supply Accessory Component Location

SECTION 7

SCHEMATIC DIAGRAMS

7.1 INTRODUCTION.

7.2 The schematic diagrams for the TTS 59B MF Sender are figures 7-1 through 7-3.

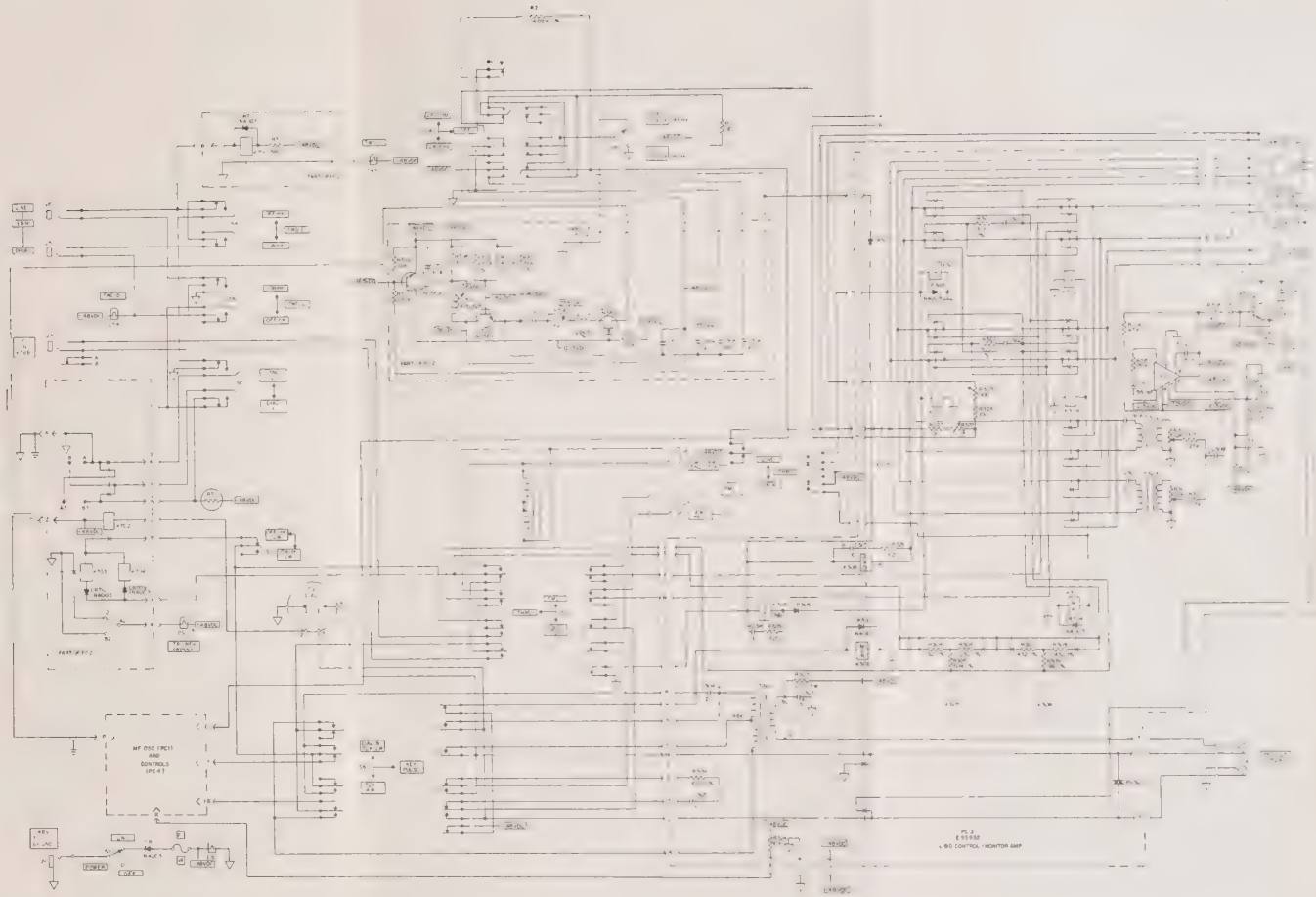


Figure 7-1. TTS 59B MF Sender, Overall Schematic Diagram

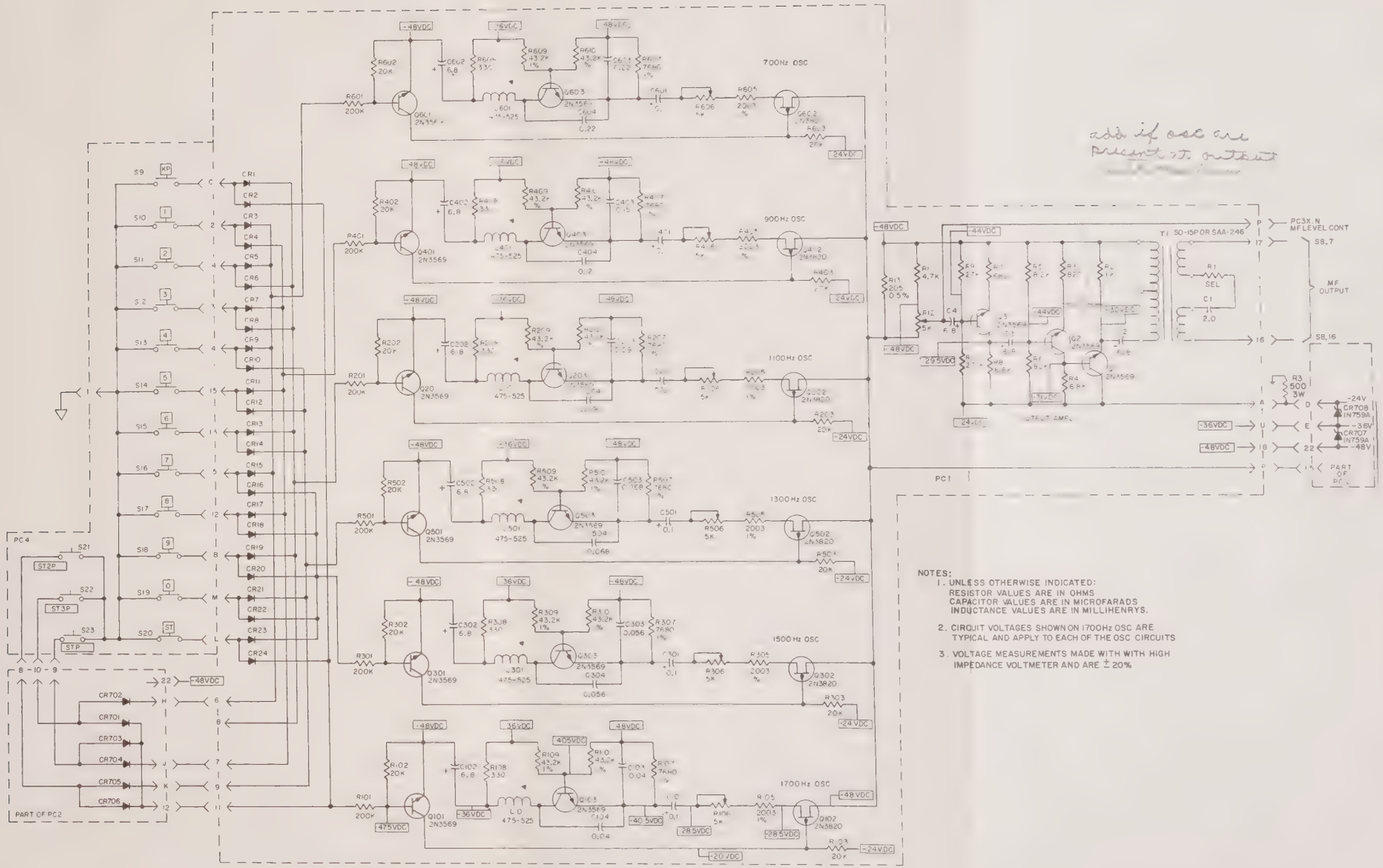
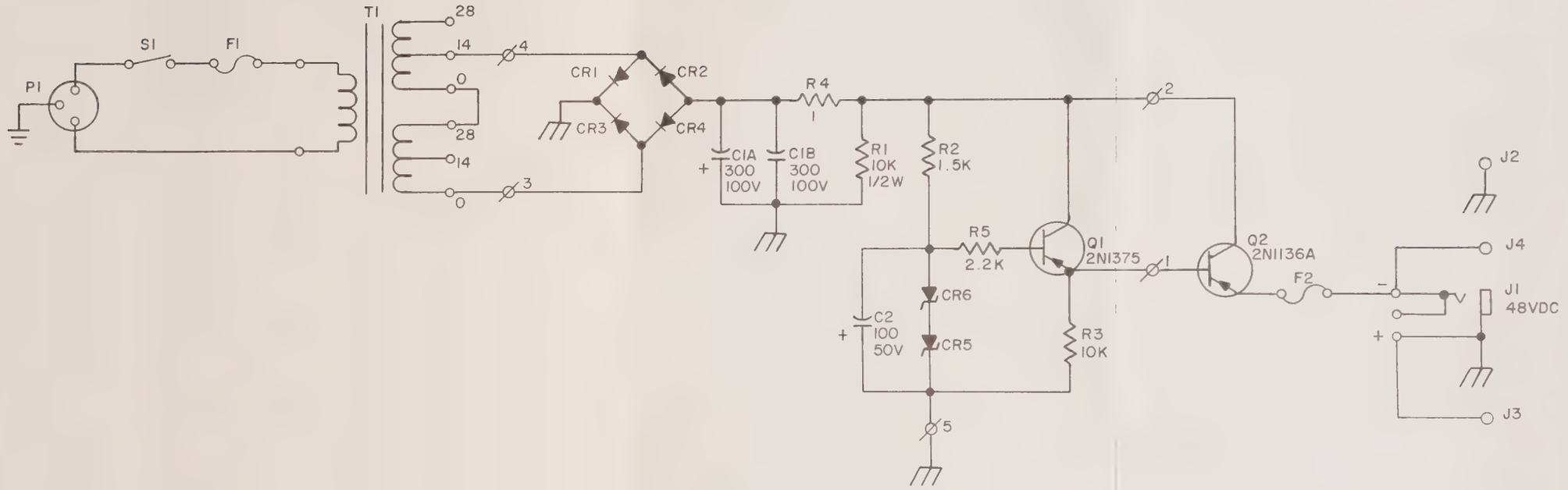
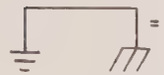


Figure 7-2. MF Generator, Schematic Diagram



NOTES:

1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.
   CR1 THRU CR4 ARE IN4003.
   CR5 AND CR6 ARE IN3029B.

2.  = CHASSIS GROUND COMMON TO BATTERY GROUND (+).

3. J3 AND J4 APPEAR ONLY ON THE PSI01.

Figure 7-3. TTS 26BXPS Power Supply Schematic Diagram

TTS 59B/BR MF Sender

Addendum 1

a. On figure 7-1, change R327 to 470Ω and R328 to 47Ω.

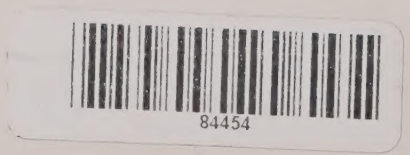
b. On table 6-6, change R327 to 470Ω and R328 to 47Ω.

c. On table 6-4, change CR1 to 1N4148.

d. In table 2-1, change SF OUTPUT LEVEL to read as follows:

SF CONT (ON HOOK) :	-13 dBm toward drop
	-36 dBm toward line
SF DIAL (OFF HOOK):	-1 dBm toward drop
	-24 dBm toward line

e. When sending TWD L (4W) a plug (active/dummy) must be inserted in the LINE REC 4W jack.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